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JOINT DISEASES, ESPECIALLY THOSE OF CHILDREN.*

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In children we find the most frequent expression of joint diseases in tuberculous degenerations. The explanation of this is simple; the joint epiphyses are the centres of activity and growth, while at the same time the natural condition of childhood is one of almost constant motion, favoring in its recklessness numerous slight, and not infrequently severe traumatisms.

Tubercle bacilli are practically always seeking to gain admittance through an open wound, through a diseased throat, through the air passages, or through any of the inlets of the body. The bacillus having gained entrance into the circulation may be arrested in the epiphysis of a joint where it lies dormant until slight traumatism, lowering the vitality of the bone, lessens resistive power, and the bacillus gains a permanent developmental foothold.

Hereditary influence is denied by some as a cause of joint tuberculosis. Heredity is a condition of lowered resistance of the body tissues against any invading bacillus. It is not to be inferred that a child of tuberculous parents will necessarily be afflicted with tuberculosis, nor that a child of healthy parents cannot become tuberculous. The child of

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healthy parents may have his resistive powers lowered by an attack of typhoid, scarlet fever, or diphtheria, by anæmia, or by any exhaustive disease. He is temporarily open to invasion and is also locally temporarily nonresistant by the lowering of vital powers. In this condition a slight traumatism with its accompanying alterations in local circulation may permit a local infection that under full healthful conditions would have been easily warded off. The healthy child of healthy parents, therefore, can and does resist and conquer many tuberculous invasions, which in the child with less resistive tissues prove disastrous. A clear understanding of this point is exceedingly important, since many surgeons dismiss the possibility of a joint disease being tuberculous, simply upon the fact that no tuberculosis could be traced in the family. In the first place, such histories are absolutely unreliable. Very few patients will admit the existence of tuberculosis, unless it is unmistakably and notoriously present. Scores upon scores of times have I seen the parents of children die of phthisis, while the patients were still under treatment, and yet not the slightest trace of tuberculosis (or scrofula) could be elicited in the history. Tuberculosis is tuberculosis wherever seen, just as a fire is a fire wherever it occurs, even though fires differ greatly in degree. The question of hereditary influence, therefore, should have no effect upon diagnosis. Upon prognosis, however, the influence of heredity is most positive and undeniable, since the healthy child will throw off many an invasion to which the less resistant will succumb. Each case should be judged by its clinical symptoms. If the symptoms of tuberculous invasion are present the diagnosis and the treatment should be speedy and absolute.

It is not to be expected that all cases of tuberculous infection will exhibit the same symptoms, since the invasion presents itself in such a variety of

forms and grades. The typical cases are easy of recognition. Take hip disease as a typical illustration. After a slight, and perhaps unnoticed, injury a limp is noticed. This limp may be slight, it may be constant, or intermittent, it will sometimes only be noticed after a long walk, in some cases it will be worse toward evening; in others it will be most marked upon rising in the morning. The very first symptom, however, even antedating the limp, will be restlessness at night. The child will shift the limb from side to side. He may complain of an ache, not a pain, and if asked as to its position, may draw his hand along the inner side of his thigh from the knee half way to the perinæum, always a suspicious sign of irritation of the obturator, or he may point to knee or ankle, or abdomen, if spondylitis has commenced. Almost simultaneously will be discovered a slight rigidity of the periarticular muscles about the affected joint, either hip, spine, knee, or ankle.

This rigidity is the most definite, the most reliable, and the earliest sign of joint invasion. It is the effort of Nature that is the plainest possible guide not only in diagnosis but in treatment. It is often present in the first ten days, the most opportune time for aborting the disease. If neglected, the golden opportunity is lost. This rigidity may manifest itself by slight limitation of motion in one direction, or in all, but is almost universally present, and a little later in the disease it becomes so absolute as almost to simulate ankylosis. At the hip rigidity is speedily noted by flexing the opposite leg upon the abdomen so as to bring the pelvis in straight line with the body, when it will be readily seen that the knee is lifted several degrees from the hard table or bed, and is either adducted or abducted.

No child, and but few adults, can be satisfactorily examined for spine or hip disease without being stripped. Failure in this important step is the cause

of one half of the errors in diagnosis. If the spine is the seat of the disease, this rigidity is marked not only in the peculiar postures and stooping movements of the child, but in every position of flexion, extension, lateral bendings, rotation, etc., all of which should be noted. This rigidity long antedates the deformity of kyphosis; in fact, the surgeon who waits for the presence of an angular kyphosis in the spine to demonstrate the giving way of the bodies of the vertebræ is no wiser than many an ignorant mother. The mischief is already done, and the physician can only repair damages that should have been prevented long before.

Pain, although ordinarily dwelt upon as one of the essential symptoms of tuberculous spine or hip or knee disease, may be entirely absent. Again, the absence of pain is often given by physicians as an excuse for failure in diagnosis. Local pain in my experience is the exception, not the rule. Reflected pains along the line of the irritated nerves which emerge from the diseased vertebræ are, however, common, and the child is treated for cough, for intestinal disease, for leg pains, etc., until too late.

Pain is recognized by the muscular sense of the patient long before it is definitely interpreted by the brain as a distinct sensation. This early recognition is evidenced by rigidity and limp, but not by open complaint. Throughout the entire course of hip disease, although the head of the femur has been destroyed and the acetabulum perforated, not a single complaint of recognizable pain at hip or the knee may have been made by the patient. On the other hand, when there is an acute osteitis or epiphysitis, the pain may be intense and excruciating from the beginning. These extremely painful cases, which continue in spite of all forms of treatment, are the ones in my experience that go on to rapid destruction of the bone, and which require early excision of the head of the femur. The night cries so

frequently accompanying hip disease are, of course, the expression of pain. You all understand their significance. The muscles that have by their rigidity so persistently guarded the joint against motion now relax during sleep, until the resultant pain arouses them again into activity, the sore head of the femur is driven suddenly into the acetabulum, and the patient arouses with a shriek. It is to control this muscular spasm that continuous extension is applied.

The important point to be emphasized is that the disease can be diagnosticated early, and that it must be diagnosticated early in order to be aborted. That hip and other joint disease can be aborted if taken in its inception is absolutely true. The same may be said of the knee and ankle. We need hardly speak of the upper extremity, as the conditions, save at the wrist, are rare.

The diagnosis is of the utmost importance, since on the early diagnosis rests the treatment of the case, and upon treatment depends the whole prognosis. Undiagnosticated, or improperly treated for the first months, destruction of the joint is exceedingly probable, and under the most favorable circumstances years will be consumed before the condition of safety is reached. An early diagnosis is just as important and perhaps more so than in appendicitis or osteomyelitis, especially since in the former disease many appendiceal infections will take care of themselves, while a tuberculous hip disease unrecognized and neglected is almost sure to progress badly. It seems impossible to me that family physicians and even excellent surgeons can take the risk of such serious consequences, when a few moments' observation and care would suffice for a correct diagnosis. The family physician at the present time is perhaps even more alert in appendicitis than the surgeon in discovering this disease (oftentimes when it does not exist at all!), while in

joint disease he allows days, weeks, months to pass by without making any diagnosis, or, worse still, will attribute the limp and pain to that greatly abused term, rheumatism. There can be but one explanation for this delay, either carelessness or ignorance.

RHEUMATISM. Any physician who will honestly review his joint cases will discover that more than ninety per cent. in children turned out to be either tuberculous, septic, or infectious, and that every case of rheumatism of a single joint in a child presented symptoms that were frank and positive. I know that I can truly say after forty years of practice, that I have never seen monoarticular rheumatism in a child that was not immediately and distinctly capable of being diagnosticated. Practically every case of joint disease in children should be treated upon the basis that it is either tuberculous or infectious. The burden of proof should lie upon the side of rheumatism, not upon the side of tuberculosis, since treatment by rest and fixation directed against the latter disease will never injure, while neglect of precautions and permitting the child to run about will ruin thousands.

Is there any possible excuse for the neglect and crime of waiting for a diagnosis? Can any one show a case benefited by delay? Hundreds of patients, however, have been crippled by delay, and many have lost their lives.

Rheumatism is an infectious disease, and while many investigators have announced the discovery of certain typical organisms, yet until they agree more definitely we must await confirmation. We talk of uric acid, of bacillary infection, of autoinfection, of faulty metabolism, and of a score of matters, but make rheumatism the dumping ground of our ignorance. Pains due to periostitis, osteitis, sprains, muscle tears, ligamentous lacerations, loose cartilages, tears of periosteum, muscle strains, fibrous

tissue inflammation, are all called rheumatism, without any attempt to discover the cause.

It is not exaggeration to say that nine out of ten cases of joint disease that come to me have been maltreated for rheumatism for weeks and months, when they have presented no symptoms of rheumatism from the beginning, except possibly the one complaint of pain. A few cases selected at random from my note books will illustrate the criminality and carelessness of attributing to rheumatism conditions that should not in any wise be confounded with that disease:

CASE I.—Girl, two years of age, treated by two or three different physicans for rheumatism. Joint disease at both hips, with thighs flexed at right angles to the body. In her attempts to stand, patient had thrown her shoulders backward, lordosing the lumbar spine; finally, sent to an instrument maker for a brace to correct the lordosis, the actual disease at the hips being ignored or unrecognized.

CASE II.—Boy, fourteen years old. Thigh fluctuating bag of pus, undulating, visible to the eye, without palpation. High fever and temperature for weeks. Thoroughly septic, yet still being treated for rheumatism. Immediate incision revealed lower epiphysis of femur entirely destroyed and separated from shaft.

CASE III.—Girl, seven years old. Treated for year by prominent physicians for rheumatism of hip, although history was typical of tuberculous hip disease, and every book symptom present. Five years of subsequent treatment required to secure even a fair result, with ankylosis in bad position.

CASE IV.—Boy, three years old. Treated for six months by a physician for rheumatism of knee, even two months after abscess and sinuses appeared. Result, two years of suppuration, two erasions, ankylosis.

CASE V.—Boy, eight years of age. Treated two years by surgeon for rheumatism of knee. Has been permitted to walk about. Joint fixed at right angle, densely infiltrated throughout whole region; ligaments destroyed; partial subluxation. Erosion, joint destroyed,

filled with tuberculous material. Result, anklosed joint.

CASE VI.—Girl, four years old. Treated by family physician for ten months for rheumatism of ankle. Walked about though in pain; finally suppuration. Rheumatic treatment still continued, although many sinuses present. Tarsal bones all carious, required several erasions. Final recovery, with only fair walking foot.

CASE VII.—Boy, ten years of age. Treated for one month by physician for rheumatism, although large pus sacs in both legs below knees. Patient thoroughly septic; immediate incisions; large quantities of pus, while upper epiphyses of both tibiae were destroyed by osteomyelitis. Bones thoroughly gouged and drained. Final recovery, with crippling deformity.

CASE VIII.—Boy, twelve years old. Treated for eighteen months for rheumatism by family physician, although thigh flexed forty degrees from psoas contraction, and a decided kyphosis was present at eighth dorsal. Back rigid, and every symptom of spinal caries. Large abscess palpable in iliac fossa.

CASE IX.—Boy, eighteen years of age. Treated by physician for rheumatism for two months. Both knees intensely painful, full of pus. Free incisions, washings and drainage. Gonococcus present.

CASE X.—Boy, thirteen years of age. Had grippe, followed by swelling of knee; treated by physician for rheumatism for two months. Joint filled with pus; streptococcus. Wide opening and packing.

CASE XI.—Boy, thirteen years old. Typhoid, followed by knee infection. Diagnosticated and treated for weeks as rheumatism. Pus in joint. Opened.

CASE XII.—Boy, twelve years of age. Pain in leg for weeks, called rheumatism. True cause, necrosis of tibia, requiring removal.

But why multiply these unpleasant recitals, which could be duplicated indefinitely.

Early diagnosis then is of the first importance. Of the difficulties in diagnosis certainly ninety per cent. will be easily solved by a careful examination

of the naked body. A few points only need be touched upon. In the spine the rapid giving way of the lateral portion of a vertebral body may give a lateral tilt, but the tilt differs from the rounded curve of lateral curvature by its short angularity to the side. Again, an angular posterior kyphosis differs from the long kyphosis of rickets. Syphilitic spoodylitis in a baby may sometimes be puzzling unless other evidences present themselves. Rest, however, is applicable in either case. Typhoid spoodylitis has its own history.

At the hip, when thickening is not marked, and the head of the bone lies on the dorsum of the ilium, and the skiagraph shows an altered head and neck; such a case may cause one to suspect congenital dislocation. In the one case, however, the acetabulum is congenitally shallow, while in hip disease the rim has been destroyed. In the former the caput and neck are always misshapen; in the latter, the head may be partially or wholly destroyed. Induration and fixation will be present in hip disease, absent in congenital deformity. In coxa vera the head is intact, and lies within the acetabulum, only the neck is altered.

In infantile paralysis, while flexion of the joint may be present, it will be readily seen that it is caused by muscular contracture, and that all other movements of the joint are exaggerated, not diminished. Muscular atrophy at hip and thigh will also take the place of induration and thickening.

Psoas contraction should always lead to an investigation of the spine, but a combination of spine and hip disease is not uncommon. Sepsis from measles or other exanthematous exhaustive diseases has usually a definite history of epiphysitis.

KNEE DIAGNOSIS. At the knee, the surgeon meets more puzzling cases than at any other joint. Tuberculous, sepsis, gonorrhoea, traumatism, loose bodies, displaced semilunars, contusions, lacerated liga-

ments, sensitive hysterical joint, all require careful consideration, especially in adults. In many cases the careful weighing of all the points in the history and the thorough consideration of the clinical facts presented, together with the aid of the x ray and other appliances, will all be essential to a correct diagnosis. A flexed, swollen, and indurated knee in a child should always be considered tuberculous unless definitely proved otherwise. In adults also, such a tuberculous invasion should first be considered; then septic, gonococcic, streptococcic, pneumococcic, or other infection. Noninfectious arthritis with effusion may follow any form of traumatism, but while the swelling may be great, it is not so indurated or doughy as that in tuberculosis. The effusion and tenderness following sprains and the slipping of semilunar cartilages, of floating bodies, of fatty or otherwise degenerated synovial fringes, will all have definite histories and varying grades of effusion and pain, but will ordinarily present less induration than tuberculosis.

CHRONIC VILLOUS SYNOVITIS. The creaking or crepitus, often plainly audible, especially on stairs, usually thought to be due to deficiency of synovial fluid. It is rather due to general relaxation of muscles or ligaments with somewhat œdematous and relaxed synovial membrane; the folds rubbing together may be pinched until thickening occurs, and later, separation of masses and the formation of floating bodies may lock the joint. Pain and slight effusion often follow. Such a condition requires local massage, muscular gymnastics, constitutional medication, slight counterirritation, etc.

Quiet Effusion into knee, as described by English writers is said to occur only in girls with irregular menstruation, but is really a slow synovitis of low grade, from slight, perhaps unrecognized, traumatisms with small effusions. Swelling is more noticeable in women, because all women have fatty

pouches upon either side of and below the patella. Such joints do not require rest, but rather regulated systematic exercises in an orthopædic gymnasium with out door life and attention to digestion and menstrual functions.

NEUROTIC HYSTERICAL KNEE, OR SENSITIVE KNEE. A neurotic hysterical knee will give any surgeon an opportunity to use his brain, and fingers, and eyes to their full limit. In such a case moderate injury of the knee from sprain, contusion, or other traumatism, has very properly had the joint placed at rest for a certain period of time through the inflammatory stage. The attending physician, however, has failed to recognize the golden moment when rest is no longer required, and has continued the fixation too long, forgetting that motion is the normal condition of a joint, and rest is only applicable during the stage of inflammation. Mature and deliberate judgment is of course necessary to decide just the time, when rest should be replaced by motion. A mistake may cause irreparable damage to a joint that is becoming tuberculous. Wise caution therefore, should be exercised and the results of motion closely watched. When the proper period for the beginning of motion, however, has been missed, and the patient has been on crutches or in bed for a year or more, as not infrequently happens, the problem that presents itself to the surgeon who now sees her for the first time, is a most puzzling one.

The neurotic knee is sensitive, the patient is pale, anæmic, shrieks at the slightest touch, cries, or faints when movement is attempted. On careful examination however, it will be noted that the symptoms are out of all proportion to the amount of deposit or swelling present, that tenderness is much less marked when the attention is distracted, that, while the signs of slight effusion exist yet, there are no evidences of degeneration such as would be noted in tuberculosis. Under thorough etherization, the

apparently complete fixation partially or wholly disappears, although some fibrous bands may still exist; the skiagraph will show bones and cartilages in good condition.

Such a sensitive joint and sensitive individual require, first that the surgeon shall secure the full confidence of the patient and shall be so certain of his diagnosis that he can assure her of ultimate relief and of good locomotion. The first movements under ether should not be sufficiently severe to arouse any serious inflammatory reaction in the oedematous and sensitive synovial membrane. On the following day the patient should be encouraged voluntarily to move the knee slightly, and the next day more. Then gentle massage, voluntary and involuntary passive movements should follow, under careful supervision. A wise masseuse or skillful physical culture instructor will greatly assist, especially if the many appliances of an orthopædic gymnasium or of a Zander institute are at hand. A second anæsthetization will occasionally be required. Soon the crutches can be replaced by a cane, then this cane will be discarded and longer walks attempted. An out door life is absolutely essential. Drugs and local applications are of secondary importance.

X RAY. The x ray is an important aid in diagnosis. By its use we may discern the amount of erosion in cartilage and bone, or the seat of tubercular deposits, the presence of pus, etc., and thus greatly aid not only in diagnosis, but also in early operation and removal of tuberculous foci by trephine or gouge, or of pus in infections. Therapeutically employed it ought to have and seemingly does have a slight influence in retarding the growth of tubercle bacilli.

The Finsen concentrated sunlight and ultra violet rays also ought to retard the growth of tubercle bacilli, but of their influence it can only be said that

their employment is still in the experimental stage as to deep regions, and is both difficult and expensive. Naked exposure of the affected joint to the direct sun's rays, I believe to be a better method of treatment.

The electric light bath is in the same stage of experimentation.

As to the treatment of tuberculous joint disease, I need only say that the diagnosis being assured, prompt, effective, and persistent efforts must be made first to arrest and limit the tuberculous invasions, and secondly to prevent the added element of suppuration. The first may be summed up under the heads of local rest and fixation, together with the fortification of the system to repel the attack. In acute cases absolute rest in bed with extension will often abort the disease if undertaken in the first ten days. Its effect in controlling muscular spasm and pain, is undoubted, but to be of service it must be absolute and rigid. My rule is to continue this horizontal extension three months after all pain has ceased. When the patient is ready for vertical locomotion, fixation is still demanded, since it also fulfills the second indication, that of protection against traumatisms and the averting of suppuration.

Discussions as to the relative value of traction versus fixation methods are endless. Both are a part of the general principle of protection. One method is applicable to a certain class of cases, the other to a second class; the surgeon must use discrimination. No traction splint yet devised exercises traction at the vital moment when the weight of the body is thrown upon the splint, no matter how tight the perineal straps are drawn. As a protection splint, however, either used with axillary crutches or as a perineal crutch, it has its place. With axillary crutches and a high shoe on the sound foot the total amount of traction exerted by the

weight of the leg in a fixation splint is probably about equal to that of a traction splint.

The general principles of rest, fixation and extension are applicable to all joints, spine, hip, knee, ankle, elbow, and wrist. After the acute stage has been passed in bed with extension, an apparatus that will limit motion, protect the diseased area, avoid weight bearing, will be indicated. We need not stop to discuss the various special appliances. Every thinking surgeon must himself work out the problem for the individual case, and must not trust it to the routine and ignorant instrument maker.

OUT OF DOORS. Most important of all considerations, however, in the treatment of joint and bone tuberculosis is the question of an out door life, not for a short portion of each day and for a brief period, but day and night and for many months. When nine years ago, I added to my ward a sun-porch large enough to accommodate the beds of all tuberculous patients, I at once found it the best part of my armamentarium. Widely open in summer and partially protected in winter, it has improved appetites, shortened disease, healed abscesses, and saved lives. No matter how cold the air may be, the children soon learn to ask for the privilege of sleeping in the fresh air. This is not a fad nor a fancy, it is a reality, and can be secured even in a city where the poor are unable to remove their children to healthier regions. A porch or tent can usually be found, and with the child upon an inexpensive gaspipe tray, change of place and position can be secured.

For the wealthy, a sanatorium life, with the education secured by its rigid rules and regulations, will be helpful upon mind and body. We shall soon learn that these conditions are as important for surgical tuberculosis as for tuberculosis of the soft parts.

When it is acknowledged that one seventh or

more of all deaths are caused by tuberculosis and that more than seventy-five per cent. of all individuals are at some time in their life affected with tuberculosis, then we shall all arouse to the importance of the conflict. We are steadily but surely advancing, and in another quarter of a century we may confidently hope to see this scourge practically conquered.

Surgical tuberculous cases should be treated in sanatoria entirely separated from the more virulent infections of the lungs. The air should be of the best, laden with pine odors if possible; the sunlight should be abundant, the exposure continuous; rest, exercise, and food should be carefully regulated. Overfeeding is undesirable; only food that is digested and assimilated is helpful; all beyond that point overtaxes the digestive apparatus, and is harmful in the end. The advantages of many regions lauded for the cure of tuberculosis consist in the fact that the hours of sunshine per month is large. Surgical tuberculous patients thrive better in sea air than do phthisical cases. The best results in my experience are to be obtained by the alternation every three months of seashore and mountain sanatoria.

For cases in bed a large porch on a level with the ward is the more desirable and convenient than tents. A roof to protect from rain should have one section of wood for hot weather, another section of glass; connected with this porch should be an uncovered porch for direct exposure of the body in sunny hours. Colored glasses or parasols will protect eyes. Side awnings may be added to protect from extreme heat and from driving storms. When such a porch cannot be secured, placing the child upon a cheap canvas covered gaspipe frame or tray permits easy transport from chamber to yard or porch, veranda or tent, but in cold weather, if

placed on trestles or supports the tray is too cold for the patient's back.

This porch should be absolutely open in summer, heated, and glass enclosed in winter, with both large sash and transoms to regulate free supply of cold fresh air at all times. The freshness of the air is more important than its temperature; consequently when abundant heat is supplied, the supply of oxygen can be increased. All beds should have large 5 inch easily moving wheels.

In the country a shed, or a tent, or a shack, is easily erected. Education as to the opening of windows can be taught. Devices for pushing the head of the bed out of a window at night are multiplying. American ingenuity will soon outstrip Germany in these details.

Hospital wards for surgical tuberculous patients should have one third the wall space of glass, should look east, south and west, with no interference to the sun's rays. Day sheds and verandas at sanatoria should be wide open toward the south. Tents are exceedingly hot in summer.

Unfortunately, many cases of surgical tuberculosis are obliged to be on crutches, and the rough ground of the woods renders locomotion difficult and dangerous, since traumatism is the chief factor in engrafting suppurative infection upon already existing tuberculous conditions.

At Wellesley Hills is found one of the best of cheaply constructed surgical tuberculous hospitals. The buildings are of rough boards, wainscoted four feet high, with movable glass sashes above. At the apex of the roof large movable windows also permit adjustment of temperature. During the day, living on flat wagons, the children are instructed and amused in a ward similarly constructed and partially warmed. At night in the colder atmosphere they are clothed with shirt, cotton flannel night-

gown, red flannel jacket, long shaker flannel gown, with hood, socks, and six to eight blankets.

Colds, bronchitis, and pneumonia are unknown. The one objection that will present itself to the lay manager is the fact that "the provision bills are doubled." A good recommendation, in my estimation; much more will be saved in drugs and in funeral expenses.

So much for the most important part of treatment.

Bier's method of constricting the limb above the diseased joint so as to produce venous stasis has never appeared rational, yet published results seem to be favorable. Its beneficial effect can only be attributed to the increased resistive power secured by a larger local supply of leucocytes. It certainly requires good judgment to determine the precise amount of stagnation required.

As to the early operative treatment of tuberculous disease of the joints, when the x ray shows decided tuberculous foci in the epiphysis either at hip, knee, or ankle, a trephine or gouge may be used to remove it, the wound flushed with absolute alcohol, and closed at once. So long as mixed infection does not occur, and there are no signs of suppuration, the outlook is favorable. When, however, a fluctuating tumor appears either from spine, or hip, or knee, the aspirator may be used, but only as a diagnostic test. If only the liquefaction of caseation is drawn, a laboratory investigation may show that no further interference is required at that time, and a second or third aspiration may assist in hastening caseation and encapsulation. Injections of iodoform are highly recommended by some surgeons, in my experience they are useless.

When aspiration shows true purulent material free incision, washing, and draining is advisable. If dead bone is found, erosion should be promptly done, all carious bone removed, pure carbolic acid

mopped over both raw and diseased surfaces, followed by thorough flushing with absolute alcohol. The wound may be closed at once. If reaccumulation occurs, the incision can be readily reopened, in other cases free drainage is necessary. In spinal caries, complete erosion of diseased bone is impossible. As a rule, choice between erosion and excision must be made after the joint is opened and is dependent upon the extent of diseased bone.

Excision of the knee or hip will be required when the disease has been neglected and when it has progressed to death of a large portion of the bone. If the trochanters of the femurs can be saved, the subsequent usefulness of the limb will be greatly increased. I have patients who can balance themselves upon tiptoe of the diseased side after excision of the head and neck of the bone.

At the knee free exposure is required. Sections should be no greater than absolutely necessary. For best results the joint should be freely opened, and every corner of the articulation searched for diseased tissue. The direct final application of pure carbolic acid followed by alcohol will satisfactorily complete the operation.

Erosion, or the removal of diseased bone only, is preferable to excision in a large majority of cases in children, since the latter operation usually interferes seriously with the epiphysis, and thus greatly lessens subsequent growth of the bone. Even five inches of shortening may thus be produced. In children repeated erosions are better than this crippling deformity, as time is an element of but small importance.

At the ankle or wrist this operation is especially indicated, since the spongy character of the carpal and tarsal bones renders complete removal of all diseased tissues very difficult. By conservative measures and several erosions, a useful movable wrist or ankle can often be secured, provided the gough has been freely used.

While conservation should be the rule in the child, yet in adults the conditions differ greatly, and amputation is often required. General surgeons, however, are too prone to amputate limbs for joint disease in children, as it is a simple and rapid method of cure. The permanent loss of a limb, however, is a serious matter, when erasions, even though several times repeated, will give a good walking limb.

In tuberculous cases true rational conservatism, which consists in meeting every emergency promptly and judiciously, should be the rule. This will require close and careful study of each case; many will be benefited by withholding operative interference; others require thorough surgical procedures. One can afford to be much more conservative in children than in adults.

Septic cases, however, are entirely different in their character and should be placed in a separate class. Infectious joint diseases other than tuberculous should be treated along extreme radical lines; the operation should be both speedy and thorough. Streptococcus, gonococcus, pneumococcus, and staphylococcus, or spyhilitic infections are all dangerous in proportion to their virulence. As a rule, all such affected joints should be widely opened, washed out with bichloride, alcohol, sterile water, or some other antiseptic, swabbed and drained. Where the infection is very virulent, as often happens at the knee, the whole joint should be laid widely open, flexed, and packed, so that poisonous germs may be removed from the body as speedily as possible. Cases of less virulence may be washed and drained. Aspiration as a preliminary measure for diagnostic purposes may be employed, but will not, as a rule, sufficiently relieve the cause of trouble. In osteomyelitis near a joint, the operation should be done in the first twenty-four or forty-eight hours at the latest, if life and limb are to be saved. If rheumatism is a bacillus infection, as seems probable in the acute cases, it will find its best relief in open-

ing of the joint and the application of carbolic acid, followed by pure alcohol, the germs having been removed, the joint can then be closed.

Gonorrhœal arthritis undoubtedly requires speedy removal of the infecting germs. While it may possibly get well under aspiration, the result is uncertain and ankylosis will probably result. Pneumococcic infection is also exceedingly liable to destroy the joint.

CONCLUSIONS. 1. Early diagnosis is the most important of all considerations. Physicians are responsible for a large majority of joint destructions chiefly from carelessness or indifference in the examination of their patients. A child with any peculiarity of gait or carriage should be examined naked.

2. Every physician should abandon the thought that pain in a single joint in a child means rheumatism. A limp or peculiar gait with rigidity of peri-articular muscles in a child always means some form of invasion, probably tuberculous, possibly septic.

3. Abort tuberculous infection by immediate absolute rest and fixation of the joint.

4. Put the patient out of doors, day and night, for a long period of time.

5. Wise conservatism consists in the prompt application of all methods of relief, whether hygienic, mechanical, or surgical. In children conservatism should be the rule, since youth has remarkable recuperative power. In adults, however, operative measures are much more frequently demanded. A limb that can readily be saved in a child, in the adult will demand amputation. If an operation will best accomplish a cure, such operation is true conservatism.

6. In septic cases following streptococcic, staphylococcic, pneumococcic, or gonococcic infection, open early and freely.

1818 CHESTNUT STREET.